

PCT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 07 December 1999 (07.12.99)	
International application No. PCT/GB99/00727	Applicant's or agent's file reference PBA/D088125PWO
International filing date (day/month/year) 19 March 1999 (19.03.99)	Priority date (day/month/year) 20 March 1998 (20.03.98)
Applicant EMES, Michael, James et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

11 November 1999 (11.11.99)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☐ was☒ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer J.M. Vivet Telephone No.: (41-22) 338.83.38
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TENT COOPERATION TREA

PCT

NOTIFICATION RELATING TO PRIORITY CLAIM

(PCT Rules 26bis.1 and 26bis.2 and
Administrative Instructions, Sections 402 and 409)

From the INTERNATIONAL BUREAU

To:

ATKINSON, Peter, Birch
Marks & Clerk
Sussex House
83-85 Mosley Street
Manchester M2 3LG
ROYAUME-UNI

Date of mailing (day/month/year) 12 July 1999 (12.07.99)	
Applicant's or agent's file reference PBA/D088125PWO	IMPORTANT NOTIFICATION
International application No. PCT/GB99/00727	International filing date (day/month/year) 19 March 1999 (19.03.99)
Applicant THE VICTORIA UNIVERSITY OF MANCHESTER et al	

The applicant is hereby **notified** of the following in respect of the priority claim(s) made in the international application.

1. ☐ **Correction of priority claim.** In accordance with the applicant's notice received on: ,
the following priority claim has been corrected to read as follows:
 - ☐ even though the indication of the number of the earlier application is missing.
 - ☐ even though the following indication in the priority claim is not the same as the corresponding indication appearing in the priority document:
2. ☒ **Addition of priority claim.** In accordance with the applicant's notice received on: 24 June 1999 (24.06.99),
the following priority claim has been added:
GB 20 March 1998 (20.03.98) 9805939.7
 - ☐ even though the indication of the number of the earlier application is missing.
 - ☐ even though the following indication in the priority claim is not the same as the corresponding indication appearing in the priority document:
3. ☐ As a **result of the correction and/or addition** of (a) priority claim(s) under items 1 and/or 2, the (earliest) priority date is:
4. ☐ **Priority claim considered not to have been made.**
 - ☐ The applicant failed to respond to the Invitation under Rule 26bis.2(a) (Form PCT/IB/316) within the prescribed time limit.
 - ☐ The applicant's notice was received after the expiration of the prescribed time limit under Rule 26bis.1(a).
 - ☐ The applicant's notice failed to correct the priority claim so as to comply with the requirements of Rule 4.10.

The applicant may, before the technical preparations for international publication have been completed and subject to the payment of a fee, request the International Bureau to publish, together with the international application, information concerning the priority claim. See Rule 26bis.2(c) and the PCT Applicant's Guide, Volume I, Annex B2(IB).
5. ☐ In case where **multiple priorities** have been claimed, the above item(s) relate to the following priority claim(s):
6. A copy of this notification has been sent to the receiving Office and
 - ☒ to the International Searching Authority (where the international search report has not yet been issued).
 - ☒ the designated Offices (which have already been notified of the receipt of the record copy).

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. (41-22) 740.14.35</p>	<p>Authorized officer</p> <p>Dominique DELMAS</p> <p>Telephone No. (41-22) 338.83.38</p>
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PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 20 January 2000 (20.01.00)	
International application No. PCT/GB99/00727	Applicant's or agent's file reference PBA/D088125PWO
International filing date (day/month/year) 19 March 1999 (19.03.99)	Priority date (day/month/year) 20 March 1998 (20.03.98)
Applicant EMES, Michael, James et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

19 October 1999 (19.10.99)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).


The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Simin Baharlou
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

REC'D 31 JUL 2000

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PBA/D088125PWO		FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB99/00727	International filing date (day/month/year) 19/03/1999	Priority date (day/month/year) 20/03/1998	
International Patent Classification (IPC) or national classification and IPC C12N15/29			
Applicant THE VICTORIA UNIVERSITY OF MANCHESTER et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 3 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none">I <input checked="" type="checkbox"/> Basis of the reportII <input type="checkbox"/> PriorityIII <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicabilityIV <input type="checkbox"/> Lack of unity of inventionV <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statementVI <input type="checkbox"/> Certain documents citedVII <input type="checkbox"/> Certain defects in the international applicationVIII <input checked="" type="checkbox"/> Certain observations on the international application			
Date of submission of the demand 19/10/1999		Date of completion of this report 26.07.2000	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer Kurz, B Telephone No. +49 89 2399 7319	



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/00727

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-14 as originally filed

Claims, No.:

1-16 with telefax of 16/06/2000

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-16
	No:	Claims	-
Inventive step (IS)	Yes:	Claims	1-16
	No:	Claims	-
Industrial applicability (IA)	Yes:	Claims	1-16
	No:	Claims	-

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/00727

2. Citations and explanations

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB99/00727

Re Item I

Basis of the report

The sequence listing, pages 1-2 as originally filed, was also taken into account.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:

D1: SULLIVAN, T.D. ET AL.: 'Analysis of maize Brittle-1 alleles and a defective suppressor-mutator-induced mutable allele.' PLANT CELL, vol. 3, December 1991 (1991-12), pages 1337-48

The amended set of claims filed on 16.06.2000 is considered to fulfill the criteria set forth in Articles 19(2) and 34(2)(b) PCT.

In general, the subject-matter of the present application is considered to be novel and inventive, as the prior art documents cited in the search report do not disclose polypeptide or DNA sequences for ADP-glucose transporters from wheat. The closest prior art document D1 discloses a DNA sequence from maize which later turned out to be a transporter protein. D1 only proposes a role of the protein in starch synthesis and a putative function as a translocator. Therefore no information that would have enabled the isolation of this specific transporter as claimed was available at the time of filing of the present application.

However, several claims suffer from major clarity problems (see section VIII).

Re Item VIII

Certain observations on the international application

Objections under Article 6 PCT:

1. Claims 1-3 and 16 relate to an ADP glucose transporter protein. However, it is not supported by the description that all the possible variants claimed indeed show

the function of a glucose transporter. It is also not supported by the description that the sequences (i)-(iii) can be present in the protein in any possible order.

No relevant data have been provided in support of the whole scope of these claims. The positions of the three sequences within the protein has not been indicated and also their contribution to the function of the protein is not known.

- 2.1 The term "...modulating activity..." in claim 6 is not clear. In general, this formulation implies that the (specific) activity of a specific protein is altered by the influence of a second compound. However, no such compound is disclosed in the application.

In addition, no common inventive concept would link this modulator and the subject-matter of all other claims so that a lack of unity according to Rule 13.1 PCT would result from this interpretation.

As a consequence of the unclear formulation in claim 6, also the meaning of claims 8 and 11-14 comprising the term "unmodulated" is unclear.

- 2.2 In addition, claim 6 generally relates to the amyloplast membrane ADP-glucose transporter. This formulation implies that there is only one ADP-glucose transporter in the amyloplast membrane. However, no support for such a statement can be found in the description. The description only discloses the presence of the transporter of claim 1 in the amyloplast membrane and claim 6 does not make reference to the specific transporter of claim 1.

3. Claim 16 contains a reference to the description. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here.
4. Due to the amendment of the claims at present the description is not in line with the claims.

CLAIMS

1. An ADPglucose transporter protein, or a modification or fragment thereof capable of ADPglucose transport activity comprising at least one amino acid sequence selected from the group of:

- | | | |
|-------|-----------------|----------------|
| (i) | SMPLNAAVKM | (SEQ ID NO. 1) |
| (ii) | GAXXXETAWACGXA | (SEQ ID NO. 2) |
| (iii) | NFRYTNFAX | (SEQ ID NO. 3) |
| (iv) | GATXGNXAHAMG | (SEQ ID NO. 4) |
| (v) | SVLWTEXXDXXXGFR | (SEQ ID NO. 5) |
| (vi) | VXLAPXNP | (SEQ ID NO. 6) |
| (vii) | PYNXAYQDXG | (SEQ ID NO. 7) |

2. The ADPglucose transporter protein according to claim 1 wherein the protein comprises at least one of the amino acid sequences (i) - (iii).

3. The ADPglucose transporter protein according to claim 2 wherein the protein comprises each of the amino acid sequences (i) - (iii).

4. The ADPglucose transporter protein according to claim 1 wherein the protein comprises each of the amino acid sequences (i) - (vii).

5. The ADPglucose transporter protein according to any one of claims 1 to 4 wherein the protein has a molecular weight of about 38kDa.

6. A DNA molecule encoding for a protein which directly or indirectly modulates ADPglucose transporter protein activity, said DNA molecule being capable of being transcribed to lead to the expression of said protein.

7. The DNA molecule according to claim 6 encoding a protein according to any one of claims 1-5.
8. A plant cell transformed with the DNA molecule according to claim 6 or 7.
9. A method of regulating starch production from a plant, plant tissue or plant cell comprising modulating activity of the amyloplast membrane ADPglucose transporter protein in said plant, plant tissue or plant cell.
10. The method according to claim 9 wherein the activity of the ADPglucose transporter is decreased.
11. The method according to claim 10 wherein starch is produced with a higher proportion of amylopectin than found in starch from an unmodulated plant, plant tissue or plant cell.
12. The method according to claim 10 wherein "waxy" starches are produced for use as thickening agents in food and coatings.
13. The method according to claim 9 wherein activity of the ADPglucose transporter is increased.
14. The method according to claim 13 wherein the yield of starch is increased relative to an unmodulated plant, plant tissue or plant cell.
15. The method according to claim 13 or 14 wherein starch is produced with a higher proportion of amylose than found in starch from an unmodulated plant, plant tissue or plant cell.

16. The method according to claim 15 wherein starch is produced with increased viscosity and gel strength relative to starch from an unmodulated plant, plant tissue or plant cell.
17. The method according to claim 15 wherein the starch is for incorporation in a baked food which goes stale less quickly than baked food containing starch derived from an unmodulated plant, plant tissue or plant cell.
18. The method according to any one of claims 13 - 17 wherein the plant, plant tissue or plant cell is transformed with the DNA molecule according to claims 6 or 7.
19. An ADPglucose transporter protein obtainable by the protocol of Example 1.

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference PBA/D088125PW0	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 99/ 00727	International filing date (day/month/year) 19/03/1999	(Earliest) Priority Date (day/month/year) 20/03/1998
Applicant THE VICTORIA UNIVERSITY OF MANCHESTER et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☒ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☒ furnished subsequently to this Authority in computer readable form.

☒ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☒ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☒ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

ADP-GLUCOSE TRANSPORTER OF THE AMYLOPLAST

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☒ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB 99/ 00727

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
See FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Present claims 6 and 8 relate to a compound defined by reference to a desirable characteristic or property, namely the ability to directly or indirectly modulate ADPglucose transfer protein activity. The claims cover all products having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and/or disclosure within the meaning of Article 5 PCT for only a very limited number of such compounds, namely those encoding the proteins of claim 1. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Independent of the above reasoning, the claims also lack clarity (Article 6 PCT). An attempt is made to define the product by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely those parts relating to nucleic acid sequences encoding a protein of claim 1.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

International Application No

/GB 99/00727

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C12N15/29 C07K14/415 A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C12N C07K A01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 654 531 A (ZENECA LTD) 24 May 1995 (1995-05-24) abstract	6,8
X	SULLIVAN, T.D. ET AL.: "Analysis of maize Brittle-1 alleles and a defective suppressor-mutator-induced mutable allele." PLANT CELL, vol. 3, December 1991 (1991-12), pages 1337-48, XP002112027 abstract; figure 5	6,8,19

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

12 August 1999

Date of mailing of the international search report

25/08/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
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Authorized officer

Smalt, R

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
T	SHANNON, J.C. ET AL.: "Brittle-1, an adenylate translocator, facilitates transfer of extraplastidial synthesized ADP-glucose into amyloplasts of maize endosperm." PLANT PHYSIOLOGY, vol. 117, August 1998 (1998-08), pages 1235-52, XP002112028 abstract ---	
A	WO 98 00533 A (PIONEER HI BRED INT) 8 January 1998 (1998-01-08) figure 2 ---	
A	HERBERS, K. ET AL.: "Manipulating metabolic partitioning in transgenic plants." TRENDS IN BIOTECHNOLOGY, vol. 14, June 1996 (1996-06), pages 198-205, XP002112029 page 204, left-hand column, paragraph 2 ---	
A	POZUETA-ROMERO, J. ET AL.: "ADP-glucose transport by the chloroplast adenylate translocator is linked to starch biosynthesis." PLANT PHYSIOLOGY, vol. 97, 1991, pages 1565-72, XP002112030 abstract ---	
A	TETLOW, I.J. ET AL.: "Starch synthesis and carbohydrate oxidation in amyloplasts from developing wheat endosperm." PLANTA, vol. 194, 1994, pages 454-60, XP002112031 cited in the application abstract ---	
T	TETLOW, I.J. ET AL.: "Characterization of ADPglucose transport in wheat endosperm amyloplasts." JOURNAL OF EXPERIMENTAL BOTANY, vol. 49, May 1998 (1998-05), pages 60-Abstr.P7.46, XP002112032 the whole document -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

GB 99/00727

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0654531	A	24-05-1995	AU 635904 B	08-04-1993
			AU 4430789 A	16-08-1990
			CA 2002788 A	10-05-1990
			EP 0368506 A	16-05-1990
			JP 2273177 A	07-11-1990
			US 5792920 A	11-08-1998
<hr/>				
WO 9800533	A	08-01-1998	AU 3384597 A	21-01-1998
			EP 0917583 A	26-05-1999
<hr/>				